Claims

1. A fuel injector comprising:

an injector body with a metallic tip having an outer surface; and

a non-metallic insulator attached to said tip and covering a portion of said outer surface.

2. The fuel injector of claim 1 wherein said metallic tip includes a valve seat and a centerline;

said tip defines a plurality of nozzle outlets; and

said insulator covers said outer surface only above a plane that is perpendicular to said centerline and positioned between said nozzle outlets and said valve seat.

3. The fuel injector of claim 1 wherein said non-metallic insulator includes a ceramic material.

4. The fuel injector of claim 3 wherein said non-metallic insulator is ceramic.

5. The fuel injector of claim 4 wherein said non-metallic insulator is less than about 3 millimeters thick.

6. The fuel injector of claim 5 wherein said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat

does not reach a tempering temperature during engine compression release braking.

7. The fuel injector of claim 1 wherein said tip includes said valve seat and said centerline;

said tip defines a plurality of nozzle outlets;

said insulator covers said outer surface only above a plane that is perpendicular to said centerline and positioned between said nozzle outlets and said valve seat;

said insulator includes a ceramic material; and

said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat does not reach said tempering temperature during engine compression release braking.

8. The fuel injector of claim 1 wherein said insulator is sufficiently resistant to heat transfer such that the temperature of the valve seat does not reach said tempering temperature during simultaneous engine compression release braking and exhaust braking.

9. A method of reducing injector tip overheating comprising the steps of:

providing a fuel injector with a metallic tip having an outer surface; and

attaching a non-metallic insulator to said tip and covering a portion of said outer surface.

10. The method of claim 9 wherein said tip includes a valve seat and a centerline;

said tip defines a plurality of nozzle outlets; and

said attaching step includes a step of attaching said insulator to said outer surface only above a plane perpendicular to said centerline, positioned between said valve seat and said nozzle outlets.

11. The method of claim 9 including a step of choosing an insulating material; and

sizing and attaching said insulating material such that the temperature of said valve seat does not reach a tempering temperature during exhaust braking.

12. An engine comprising:

an engine housing with a plurality of fuel injectors attached;

each of said fuel injectors having a metallic tip with an outer surface;

a non-metallic insulator attached to said tip and covering a portion of said outer surface;

each of said injectors positioned at least partially within an engine cylinder; and

said engine includes at least one engine compression release brake.

13. The engine of claim 12 wherein:

each injector has a metallic tip with a valve seat and a centerline;

said tip defines a plurality of nozzle outlets;

said insulator covers said outer surface only above a plane that is perpendicular to said centerline and positioned between said nozzle outlets and said valve seat.

14. The engine of claim 12 wherein said non-metallic insulator includes a ceramic material.

15. The engine of claim 14 wherein said non-metallic insulator is ceramic.

16. The engine of claim 15 wherein said non-metallic insulator is less than about 3 millimeters thick.

17. The engine of claim 16 wherein said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat does not reach a tempering temperature during engine compression release braking.

18. The engine of claim 17 wherein said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat does not reach a tempering temperature during simultaneous engine compression release braking and exhaust braking.

19. The engine of claim 12 wherein said tip includes said valve seat and said centerline;

said tip defines a plurality of nozzle outlets;

said insulator covers said outer surface only above a plane that is perpendicular to said centerline and positioned between said nozzle outlets and said valve seat;

said insulator includes a ceramic material; and

said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat does not reach said tempering temperature during engine compression release braking.

20. The engine of claim 19 wherein said insulator is sufficiently resistant to heat transfer such that the temperature of said valve seat does not reach said tempering temperature during simultaneous engine compression release braking and exhaust braking.